

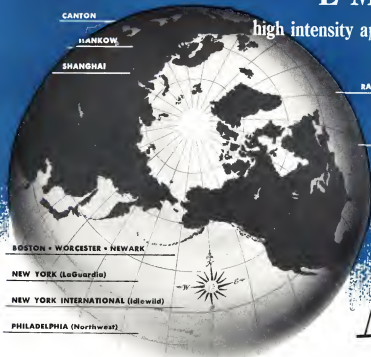
# AVIATION WEEK

JAN. 17, 1949

A MCGRAW HILL PUBLICATION

## L-M—Bartow

high intensity approach and runway lights



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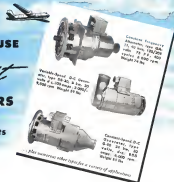
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Small or large, d.c. or a.c., low voltage or high voltage, Westinghouse generators have extra dependability. It is the result of more than 15 years' experience in building engine-driven generators... wartime schedules that topped 5,000 generators a month... engineering and research that produced this unchallengeable record of generator "knock-outs"...

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**Fit to last:** increased, high-altitude brushes—will do only answer for long break life.

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## ON THE GROUND

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Those are familiar words at the Kidde proving grounds, where we deliberately start engine fires by the hundred. What's more, we start them in a missing wing that doubles for a high-speed slipstream.

How do we do it?

With a pair of Kidde power plants set up in tandem. The propeller of the front engine seizes the "slipstream" back through the rear nacelle, where we start the fires. The cockpit is placed to give the man at the controls a clear view of the flames.

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Because only by simulating, as closely as possible, the actual conditions of high-speed flight can we determine the true efficiency of all the many fire-extinguishing agents. It's under conditions like these that we've blasted out engine fires with CO<sub>2</sub>, CH<sub>3</sub>, MR, DL, the Freons.

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## What the Budget Means to Procurement

Congress is expected to fight Truman's request for a cut in air funds.

### By Robert Hulse

President Truman's fiscal 1950 air power budget will lay a stiff fight on Capitol Hill this spring.

The Truman budget call for a sharp slash in military aircraft production from fiscal 1949 figures for both Air Force and Navy aircraft procurement. Air Force was cut from 48 groups and 10 squadrons to 45 groups and 10 squadrons.

■ **Home Spun**—The fiscal 1950 budget will cut the national defense total of \$15.7 billion in new obligations authorized into three almost equal segments.

Air Force, \$4.6 billion  
Navy, \$4.6 billion  
Army, \$4.5 billion

Also included in the defense budget were \$18 million for the Secretary of Defense, \$380 million for the beginning of Universal Military Training programs that the President and would soon cost \$2 billion a year) and \$575 million for displaying storage munitions.

For the aircraft industry this budget means the allocation of \$1.3 billion in new aircraft procurement during fiscal 1950. This compares with \$2.8 billion in new obligations authorized for fiscal 1949.

The \$1.3 billion will buy 2,699 planes with an engine output of 34 million lb. This compares with 3,655 planes with engines output of 47 million lb. contracted for during fiscal 1949. The second step in the U. S. Air Force, "Go Group and Navy, 14-1800 plane, systems program modelled, required two contract reductions of \$1.3 billion for fiscal 1950: 12.5 for B-36 and 5.7 for the Navy.

■ **Cash Income**—The USAF is scheduled to contract for 1,600 new planes with new engines, weight of 25 million lb. in fiscal 1950. The Navy will buy an estimated 1,600 planes with airframe weight of 9 million lb.

The new contract authorizations are for production that will extend over the next two calendar years. Actual con-

### Budget Highlights

#### Total Obligational Authority for Aircraft Procurement

(including major industrial mobilization, electronics, as well as airplane)

	In Millions of Dollars	
	1948	1949
U. S. Air Force	2,440	2,440
Navy	751	891
Total	3,191	3,331

#### Number of Aircraft to be Purchased

	1948	1949
U. S. Air Force	2,812	2,160
(175 million lb.)	(27 million lb.)	
Navy	1,215	1,600
(112 million lb.)	(79 million lb.)	
Total	4,027	3,760

#### Airframe Weight Estimates

	1948	1949
Aircraft contracted for	47 million lb. (175 million lb.)	34 million lb.
March deliveries	27 million lb. (175 million lb.)	37 million lb.

### Air Power Yardstick

(Recommendations for maximum annual military aircraft procurement and amount recommended by the budget for 1950)

#### by Congressional Committee 1945

Normal maximum they would prefer as well as normal  
Normal maximum they would prefer as well as normal

President's Air Policy Commission 1948  
Recommendation for 1949 (airframe cost)  
Recommendation for 1950 (airframe cost)

Congressional Airframe Policy Board 1946  
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normal and related equipment will be delivered by the industry and paid for in 1950 and the following years.

Deliveries of 37 million airframe lbs. as reported through fiscal 1950 compared with about 25 million airframe lbs. to be delivered before the end of fiscal 1949 and early July.

President Truman also indicated that normal aircraft procurement would be necessary in fiscal 1951 after new weapons plane storage plans are exhausted.

Proving grounds of legislation authorizing a long term aircraft procurement program, all funds appropriated for both Air Force and Navy aircraft procurement in fiscal 1950 will be "available until expended" to avoid the two-year restriction limit on military expenditures. Strictly procedure was followed for fiscal 1949 procurement funds.

■ **Flight Rights**—Fight to boost the fiscal 1950 air power appropriations began almost before the colors of Truman's budget message faded. Rep. Carl Vinson (D-Ga.) leader of the air power bloc on Capitol Hill indicated that his strategy would be aimed at adding about \$1.2 billion to USAF procurement funds to meet the second step in the buildup to a 74-Group Regular Air Force with supporting resources, begun last year in a result of its overbuilding in previous years to boost the President's air power budget for fiscal 1949.

Vinson, confided with Air Secretary W. Stuart Henson last week of the Pentagon shortly after the President's budget message was delivered. Showing his only comment to date has been his letter to the second annual planning for the full four year USAF program, Vinson, Senate class to the Secretary, indicated that the Air Force will make a determined fight to maintain its four year expansion program.

■ **COB Rate**—With Vinson writing the scope for the House Armed Services Committee there will be plenty of opportunities for Senate and other USAF leaders to publicly state their case during Congressional hearings in response to direct questions by friendly committee members and visiting the big role required by the executive branch of the government. Defense Secretary Forrestal's official memorandum warning to the Air Force that Navy to obtain new production are additional information on aircraft procurement as outlined in the fiscal 1950 budget although the budget did not put all the information needed for adequate comparison of USAF and Navy aircraft programs.

Highlights of the USAF budget:

- **New Aircraft**—\$1,634,000,000 for new aircraft, including production facilities expansion.
- **Ground Munitions**—\$115 million.
- **Electronics**—\$115 million.

- **Industrial Mobilization**—\$16,912,800.
- **Research and Development**—\$215 million is included, including \$21,615,000 for research, \$9,554,400 for development, \$12,515,000 for operational engineering, and \$48,979,000 for management and operation studies.
- **Air Reserve**—\$12 million for an increase in 47,512 officers and men with each pilot getting 120 hours a year flying time.
- **Air National Guard**—\$115 million for an increase to 49,500 officers and men with each pilot getting 125 hours of flying time.
- **Air ROTC**—\$51,708,000.
- **Air Section**—\$48,000,000 for a contingency fund.

- **U. S. Air Force budget highlights**
- **Philadel**—\$642,512,980.
- **Philadel**—\$642,512,980.
- **Industrial Mobilization**—\$16,912,800.
- **Aeronautical Instruments**—\$7,964,800.
- **Electronics**—\$1,634,000,000.
- **Research and Development**—\$215,495,000.

## Budget Boosts

President seeks record amounts for support of civil aviation agencies.

The President's 1950 fiscal year budget includes a program of procurement authorized, promotion of commercial aviation and record-high appropriations for the Civil Aeronautics Administration and the Civil Aeronautics Board, as well as the National Advisory Committee for Aeronautics.

Declaring that commercial aviation, the keystone of our transportation system, is still in a stage of development that requires additional assistance, the President declared that:

■ **Fiscal 1950 Program**—The proposed 1950 fiscal year program would mean a \$74 million increase in appropriations for the Civil Aeronautics Administration, through new plane development, airport



## X-1 Makes Own Power Take-off

The Bell X-1, rocket-powered aircraft, took off under its own power and set a new unofficial mile of climb record of more than 23,000 ft per minute.

Originally designed to take off under its own power, the Bell X-1 had previously been launched at around 50,000 ft from the belly of a specially modified B-29. No certification was required for the release at "Moose River, N.Y."

X-1 reached 23,000 ft in one minute and 40 seconds.

It climbed at speeds up to 350 mph and remained in the air for eight minutes of which five minutes, eight seconds, flight. Maximum endurance of the X-1 in powered flight is two and a half minutes with all four rocket tubes firing in 60 minutes using the takes single.

■ **No Record**—China-Pike Air Force will not seek to make official X-1 record of a 15,000 ft per minute mile of climb during the March tests. Present rate of climb record is held by the Convener P-81 which reached 10,000 ft in 100 seconds. The X-1 has also set a new official record of 65,000 ft. (Air Force Wing, Det. 27—some 3000 ft higher than the present record held by a British jet-powered Vampire.

construction, runway facilities, etc.

This would comprise as \$194 million construction, aviation personnel expenses by CAA and NACA for the current fiscal year, and a \$136 million expenditure for the 1945 fiscal year.

**Budget Breakdowns**—The budget program lists more allocations for civil aviation agencies for the coming year. CAA, \$218,098,500—\$157,000 cash and \$67 million contract authorization. This tops by \$36,158,500 CAA's current year budget of \$118,170,000. \$193,478,000 cash and \$18 million contract authorization. (The President is directed he would add a \$6,627,000 supplemental, boosting CAA's current year funds to \$197,095,000.)

CAB, \$5,850,000—\$5,850,000 increase of \$131,900 over the \$5,718,100 provided for this year. Of the increase, \$168,000 is earmarked for stopping up mail out work, and another \$189,900 for airline cost standards development. (The President is directed he would add a \$187,900 supplemental, boosting CAB's current year funds to \$1,037,500.)

NACA, \$125,205,000—\$61,795,000 cash and \$21 million contract authorization. This is \$15,055,000 over NACA's current year budget of \$110,600—\$47,918,000 cash and \$12 million contract authorization.

CAA increases—Major CAA increases are proposed for acquiring new aircraft facilities, for expanding the electronic and navigation program, and for increasing research with the long-range service facilities program looking to all activities for about 15 years.

Totally, all CAA programs recommended in the 1945 budget.

**Salaries and Expenses**, \$97,457,000. This comprises with \$62,451,000 for the current year. It includes \$49,526,954 for operations at the fiscal year-end, \$25,573,137 more than this year's \$61,247,797, \$11,002,825 for an extra enforcement (higher rates than this year's \$10,860,045), \$2,515,790 for operations of auxiliary units, and \$1,000,000 for this year's \$2,100,000, \$748,585 for airport planning, compared with this year's \$569,851.

**Facilities**—At Air Navigation Facilities—\$78,150,000—\$25,418,000 cash and \$25 million contract authorization. This is more than double the \$21,098,000—\$10,899,000 cash and \$12 million contract authorization—provided for the current year. Of the proposed \$60,151,000 allocation, \$42,179,000—\$15,650,000 cash and \$26 million contract authorization—is for equipping the federal aviation system with electronics and for all-weather flying. Earmarked for provision of previous contracts is \$6 million of the proposed cash appropriation.

**Development of Air Navigation Facilities**—\$10 million—\$5 million cash and

\$5 million contract authorization. This is for moving ahead with research requested by the year 41 aviation facilities program prepared by the Radio Technical Commission on Aeronautics. Expenditures will be supervised by the Air Navigation Development Board (Thomas W. No. 79).

**Airport Program**, \$13.5 million—\$3 million cash and \$5 million contract authorization. Of the amount, \$1.5 million will be used to liquidate contracts, leaving \$40 million available with which to move forward with the program. That will keep airport construction at the average level—CAA had \$40 million for this year—\$15 million cash and \$17 million contract authorization.

**Airline Auxiliary**, \$5.5 million. CAA has given \$5 million in contract authorization this year to start construction at new commercial airports of "airline and facilities."

**Workshops, National Airport Operations**, \$1.5 million. This is a slight increase over the \$1,185,000 for the year. An additional \$25,500 for construction was included. This year CAA had

\$1,515,000 allocated for construction. **Technical Development**, \$1.5 million. This is the same amount available this year.

**NACA Income**—The \$25,205,000 recommended for NACA provides for a big increase in personnel and a major expansion of its construction program. The allocation is included.

**Salaries and Expenses**, \$48,705,000—\$10,998,800 over this year's allocation of \$17,355,000.

**Construction and Equipment**, \$36.5 million—\$15 million cash and \$21.5 million contract authorization. This compares with this year's \$28.2 million allocation—\$18.2 million cash and \$10 million contract authorization. Under the 1942 budget, NACA's current year contract was a \$12,535,000 construction program at Langley Field, as \$11,342,000 per year at the Ames Laboratory, and a \$10,855,000 program at the Cleveland Laboratory, No. 79.

**Workshops**, National Airport Operations, \$1.5 million. This is a slight increase over the \$1,185,000 for the year. An additional \$25,500 for construction was included. This year CAA had

main program necessary for the quick in progress required in order of air.

**Equipment**—Subcommittee on Symington pointed out that the USAF expansion program authorized \$5 million program for last year. It now has 60 groups and was scheduled to be at 60 groups by June 1946, and 70 groups for the following September. He said that by the time the full 70 groups were authorized 60 of them would be at full construction.

Symington also noted confidence that the aircraft industry would begin its biggest production step up in schedule by next July, the end of fiscal 1946.

**Priority Goals**—Among the top priorities goals of the USAF during the present fiscal year Symington listed:

**Long Range Development**—USAF wants legislative authority, to expand its appropriations over a five year period rather than the present two years.

**Engineering Center**—USAF will ask for legislative authority to begin development of a large air engineering and development center for supersonic aircraft and missiles.

**Radio Warning Net**—Research and development funds will be sought to establish a radio warning and fighter control network, to protect the American continent against surprise air attack.

**Prototype Development**—USAF will support a limited program to develop prototypes of major and minor aircraft that are outside the pace for conventional military needs and can be altered for military needs.

**Supply Property**—USAF will ask to speed taking over War Asset Administration responsibility for disposing of war surplus aircraft and parts after Feb. 28, 1946.

## Speed Gains Seen

### At Miami Air Races

Average speed of midjet plane races soared up a dramatic notch last week in the 1945 Continental Motor Trophy Race at Miami, when Steve Wittman, Oakbrook, Wis., veteran race pilot and designer won the first round with 176.507 mph average. His 1000 cc seven mph faster than the 169.688 mph average race of Herman (Pat) Sullivan in the 1945 Goodyear midjet race at Cleveland.

Wittman's record, previous, 164.423 mph set at the Goodyear race last year, was the fastest record since 1941 and both won the record of other competitors in the 21 mile race around the island course. Wittman was flying his "Boomer" midjet in which he took second in the 1946 Goodyear, and second pilot the Wittman-designed "Buster" plane.

Long Cheng Battle-Hunter competition was the unsuccessful effort of Air

Crafts, veteran Los Angeles race pilot, to catch Don Long, Lock Haven, Pa., four place. Don Long's sidekick on the deck, firing and sharp nose team, his Steve Pitt race was unable to beat out Long's "Buster Mustang." Both were well behind third place T. A. Reed, Glendale, Pa., in a P-40 Special Hellcat averaged 170.011 mph—146.767 mph and Chester 165.718 mph.



## Air Refueling: Key to Long Range

Strategic air power of the U.S. Air Force, will be dependent on aerial refueling for its extremely long range operation in the foreseeable future.

Members of the Air Force committee to develop plans capable of increasing strategic air attacks from American bases without aerial refueling came on the first annual report of Gen. Hoyt H. Vandenberg, USAF chief of staff. Vandenberg's report was published as part of Air War Report by Stuart Symington's report to the Secretary of National Defense.

**Committee Report**—Vandenberg's report stated:

"To meet the Air Force requirements for a strategic bomber capable of delivering a bombing attack upon all targets at extreme range, a committee was established to consider the problem and to present proposals for consideration by the U.S. Air Force and the Department of Defense. This committee, composed of representatives of headquarters, USAF, the Air University, Strategic Air Command, and Air Materiel Command made an exhaustive study during the last year of aerial refueling and its effect on other sources.

"The final report of the committee concluded that as much of acceptable air power as can be built in peacetime is based on the demand for refueling as to air or night refueling was considered. New military characteristics were written on this basis and approved by the staff and weapons board. The Air Force is therefore aggressively de-

veloping the air as a refueling program, both in the air and on the ground, which will be the key to the future of the United States, Litchburg, Va., reports. Howard on the St. William's High Institute, Virginia.

Beth, Michigan, denture, Temp. The pilot was the winner of the 1945 Air Force pilot for the annual tournament won. Cato Butler, Springfield, Ohio was second.



**Development**—Although this report was written last summer at the close of the 1945 fiscal year, its release was a key to the Air Force program for refueling a major peak of activity on Capitol Hill will again receive the latter controversy between the Air Force and the Navy over the strategic possibilities of land-based versus air-based aircraft.

Technical experts of the USAF and the Navy are studying the problem of aerial refueling as a key to the future of the United States. The committee is studying the problem of aerial refueling as a key to the future of the United States. The committee is studying the problem of aerial refueling as a key to the future of the United States.

**Means Needed**—USAF spokesmen in stated that an extraordinary little plane bomber could be developed within 10 to 15 years provided sufficient funds were available for the required research and development. They admitted prospect of obtaining these funds is dim.

Symington, of the USAF, points out that the development of a strategic bomber is a task that requires a long time to produce aircraft smaller than the current 10 to 15 years performance is the same speed range.



St. Stuart Symington

been authorized for the Air Force. **USAF Plans**—Symington listed the four principal objectives of the USAF expansion program:

• Replacement of the "obsolete" World War II type planes with the latest technology mid-jet types capable of meeting new combat needs and a new potential adversary.

• A research and development program that will develop the best possible equipment.

• Expansion of a long range striking force that can operate on hostile territory at this source and operate as a tangible threat to potential aggression.

## Symington Says:

"None too much time" to provide 70-Group Air Force as planned.

Stuart Symington is building a 70-Group Air Force plan, he says, and it is not too late to provide it by the first annual report published last week. This program requires 12,441 combat aircraft.

Symington's plan was written last summer at the end of fiscal 1945 but released the day before released. The report submitted his fiscal 1946 budget to Congress calling for a shift in the USAF to 40 regular groups and 3000 planes. Symington warned that it is essential to continue with the second step in the 70 Group program began last year of the United States to attain an average of 1946.

**Waves of War**—"This country has come too much time to provide itself with the means of its own protection," Symington cautioned. "It must offset the side of its own and resources that are available in sufficient and stop-and-start planning."

When quoted on his sketch of the Air Force, President Truman said that the number of groups was a misleading measure of Air power and that the number of planes and men was a better yardstick. Symington explained that 70 combat groups are envisioned to the next expansion program which had





Airfield here 1,000 miles and McCarroll (left) World War II veteran, commander of the Berlin Airlift, is shown here with the Soviet Air Force commander, General Nikolai G. Zhukov.



Searchlights of Landing Airlift come out at night to guide ships in unloading cargo in darkness during Berlin Airlift. Searchlights of Landing Airlift come out at night to guide ships in unloading cargo in darkness during Berlin Airlift.

## Tanner Outlines 'Ideal' Cargo Plane

After six months of operations, commander describes requirements; makes suggestions to manufacturers.

By John Christie  
(McCarroll (left) World War II)

WISCONSIN, Germany—Airfield task force commander Maj. Gen. Wilbur H. Tanner outlined the cargo plane of the future as he outlined the first six months of Operation Vittles in an address before the American War College.

Tanner considers goal of the air force of larger type aircraft one of the prime issues facing the air force.

► C-54 is C-47—Tanner figures gathered during the past several months at West and September 1948. Air Force assigned the month of the C-54 and the C-47. Says Tanner.

► In even respect the C-54 proved more convenient. "We also had a C-54 which could fly to Berlin. Based on this most recent experience, we applied the same factors and found that this plane which is designed to carry 25 tons, was much more convenient in all respects than the 10-ton plane. It

—beat the 10-ton plane in the 10-ton plane was cheaper than the 10-ton plane.

► He said that the type aircraft needed in the air primarily designed for carrying freight—aircraft transport, who also directed the "Thing" operation during the war. "It must be economical to operate, have maximum rate of maintenance, and be capable of loading and unloading of mechanical devices. All aspects of its design should be subordinate to this test. Will it make sense?"

► Cargo Plane Requirements—Tanner said his staff would consider themselves guided by an one type plane. They do, however, have definite basic requirements.

► Design—A conventional four-engine transport type with 10000-gal fuel, able to fly down 25 tons after a 3000-

psi flight. Cockpit designed to permit operation with a crew of not more than three when necessary and not required.

► Performance—Speed of 375 mph, ability to climb 10,000 ft in 10 min, and landing operations at 100 mph, for 10 hr, to permit landing on rough fields in front of landing operations. Adequate power and flight characteristics in adverse conditions and hazards on the 5000 ft runway runway, found at landing airports.

► Loading—Storage designed for loading to an average density of 10 lb/cu ft up to a 25-ton load. Inside fuselage walls of at least 16 in. Loading and unloading without aid of equipment such as hoist, lifts, etc. Several engines down long enough to mount a full track with its canopy. Minimum for cargo movement within the plane.

While Tanner did not comment on aircraft plane design, it is generally considered that a change in such aircraft as the C-54, C-47, C-54, etc., would be too drastic in terms of training for operators and maintenance and a shift in loading equipment, servicing facilities.

An interim aircraft—such as the DC-6A (single version of the DC-6) has been mentioned to bridge the gap between a C-54 and the new type cargo plane. The DC-6A can carry 25 tons more than the C-54.

► Traffic Control Advances—Tanner said he had recently observed "The airfield has indicated that air traffic control should be 10 years." Two existing and complementary systems, the one provided for use of GCA, and straight-in approach methods.

In its role as a primary, it does not require for landing operation. Traffic GCA has proved itself beyond doubt," says Tanner. "Without GCA, our operation could not have been near so successful. Indeed, we couldn't have flown at all some days."

► Two Air Chances—Landing at low altitude aircraft with GCA have become standard procedure. With simple straight-in approach patterns at each field, GCA can have four planes in its scope at one time, and direct two to down at the same time.

Straight-in approach patterns have expedited traffic flow to the point where four aircraft intervals or less are common place in the operation. Safety has been enhanced by the elimination of stranding and holding.

► Overhead Response—While tactical radar control has helped keep aircraft intervals high and accident rates low, overhead of the C-54 is proving expensive.

Tanner's maintenance men have devised a number of recommendations for development of accessories aimed at cutting maintenance time. To avoid more when they make these proposals.



Visible on engine made from jet engine was also of Major Fred G. Lefter. Now used to show for basic steps of engine plane, its being adapted to clean runway.

► An auxiliary powerplant capable of operating the aircraft electrical system on the ground and providing sufficient power to permit use of extension cords at needed. Electrical outlets should be provided in the landing gear wells and on fuselage.

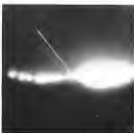
► As an comparison of sufficient space to permit rotation of struts, struts, accumulators, etc. A part of this type could be used to permit pneumatic tools to be used in the landing gear wells and on fuselage.

► A section on such engine that would eliminate the necessity of changing of every 100 hr as presently required. Use of cartridge filters that could be replaced easily and quickly might be a solution.

► As a checkmate, repeated hydraulic pumps that would permit operation of the aircraft hydraulic system without use of external hydraulic pump or operating engine.

► Landing gear strut jacks. The ability to change tires and repair ballast without necessity of jacking entire aircraft is of real importance. A part of this type could be built or attached to each strut and operated by means of a hydraulic hand pump located in the plane.

While these accessories would not be necessary in normal commercial operations, they would find considerable application in military aviation and perhaps in commercial service in less than 10 years, general facilities are under development.



BY NIGHT—The landing and navigation lights of an incoming C-54 from the left show between the approach lights.



BY DAY—The poles of the high intensity approach lights at Tangier Island stand out above the tops of a runway.



Ground overlights over Tangier guide incoming planes. This, as well as the other light photos, is being exposed. While less are headlights of moving traffic.

## Cutbacks Make Way For New B-36 Orders

U. S. Air Force cancelled \$300 million worth of scheduled jet bomber, fighter and helicopter production to buy a substantial new quantity of Convair B-36 bombers. Previous order was for 96 of which 30 have been completed.

The new Convair order will include the B-36-4, a 10-engine, photo reconnaissance version of the B-36 featuring an R-33-4, a Whitley-Wegm Major engine and four jet engines along its span under each wing tip. The jet will be operated only as emergency power to enable emergency takeoff on long missions.

Modifications included in the \$100 million to be allocated will be modifications to B-36s and Boeing B-50s now in production.

The following 1949 production schedule was ordered by the Air Force to provide the \$100 million:

- Northrop-B-45-10 jet flying wings to have been built at Convair's Ft. Worth plant.

- C-117-100 fighter transport aircraft transports and active service planes.

- North American-B-36-4s, low jet light bombers. These were the last of an original order for 190 B-36s now in

production at North American's Long Beach plant.

118 F-94A sweptwing jet fighters these fighters were originally designated the F-94C and were scheduled for production during 1949.

• Koffert-10 B-10 twin motor transport helicopters. These helicopters were designed by Koffert but were to be produced by some other company to have been designated by the USAF.

Inquiries at the B-36 order and work orders of B-36s are aimed at getting a long range striking force now considered essential as soon as possible. USAF and they were "in line with" President Truman's budget savings cutting the Air Force to 44,000 personnel. Action was taken by a special board (American War, Jan. 10) composed of Gen. Fairchild, Norton Craig and Gen. Norcross.

## Small Business Work Totals \$28 Million

DAYTON—More than 1900 Air Force procurement contracts totaling \$28 million have been let with small business—establishments averaging less than 500 employees—in a six month period ending Nov. 30, 1949.

Major Gen. E. B. Wolfe, director of procurement and industrial planning for Air Materiel Command, announced Jan. 17 that 1949 contracts, or nearly half of the total number let in that period had gone to manufacturers in the less than \$50 employee category.

Subcontract High-In addition, he estimated, subcontracts let to small business by other Air Force prime contractors will total many more millions of dollars, possibly for components going into USAF planes.

Since other small manufacturers take advantage of the opportunities now available to become Air Force suppliers, the percentage of small business in the total volume of contracts is expected to mount even higher this year.

Small business in more specific has an edge over the big companies in leading competition, AMC procurement analysis report.

Research costs which vary and bulk large for big industry in amount of contract bids, are often part of a kind of overhead for the small firm. And the small manufacturer can probably accept a contract which will keep his plant at capacity operation, but which would be negligible for the huge factory of his big competitor.

Utilization of small business contracts and their value against the total number of contracts let and their value.

	Small Business	Total	Small Business	Total
Number	1,900	1,900	1,900	1,900
Value	\$28,000,000	\$28,000,000	\$28,000,000	\$28,000,000
Average	\$14,737	\$14,737	\$14,737	\$14,737
Per cent of total	100	100	100	100

Source: Air Materiel Command, Dayton, Ohio.

Major Gen. H. A. Shepard, procurement division chief, points out that many small businesses which are eligible and qualified to bid for the contracts, have not yet registered to become qualified Air Force suppliers.

Application should be addressed by the firm to Commanding General AMC, Wright Patterson AFB, Dayton Ohio, Attention: MCM/MS/2, Source & Price Records. The firm will receive a form to assist in producing suitable facilities.

## New Altimeter

A new sensitive altimeter with a simplified dial that cuts to a minimum the possibility of misreading now disclosed last week by Kollsman Instrument Division of the Squire D. Co.

In place of the three pointer type, having 100, 2000 and 14,000 ft. graduations on separate Kollsman altimeters the face of the new instrument has only one dial that operates in 100 ft. units and scales one revolution per hour around the dial. A two digit counter set at 1000 ft. in units of thousands of feet.

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## Aircraft Manufacturer Mergers?

The recent shifting of aircraft orders among key builders is being viewed by informed observers as strong impetus for further merger discussions within the industry.

By favoring Convair with increased orders for the B-36 while withdrawing some orders from Northrop, the AF could be expressing displeasure with Northrop in not meeting its terms with Convair at a previously discussed consolidation, it is pointed out.

Recently, reliable reports have indicated that active negotiations have been resumed for a three-way deal involving Convair, Northrop and Cessna-Wright. This combine holds considerable possibilities in that Convair would supply the physical plant facilities, Northrop the engineering know-how, and Cessna-Wright the sales.

It is known that a Cessna representative has been making overtures to Cessna-Wright in behalf of this projected consolidation but was meeting with resistance.

Nevertheless, the recent election of Paul Staudt, senior partner of a major New York stock exchange firm to the post of chairman of the executive committee of Cessna-Wright, has signified the view that efforts for this proposed three-way deal are continuing. It is known that this financial firm has had very close business connections with the Main Club, which controls Convair.

Top Air Force people for some time have contended that there are no plans to merge companies on the ground of business that is likely to be handicapped and that mergers would sacrifice the no more health of the industry.

There is also the feeling in Washington that any new merger proposals would involve some type of sacrifice to the Air Force. The first division of the Justice Department then the plan for a Lockheed-Goodrich merger stands up. This merger was unofficially vetoed by the department.

## ENGINEERING

## How Much Force Can Body Withstand?

Tolerance to acceleration is prime factor in fast-craft operation.

By Charles F. Lombard\*

With the development of high-speed airplanes designed to withstand large aerodynamic stresses, the problem of human tolerance to forces associated with acceleration has become of major importance.

Particularly in high speed cars, various maneuvers, meteorologic conditions, braking, accidental impacts, and the like, impose upon the human body stresses often far beyond ordinary experience.

Results range from impairment of vision and judgment to unconsciousness and varying degrees of damage to the body's structure.

• **Velocity, Force Factors**—It is important to realize that velocity, as such, does not affect the body. Man could safely travel at any imaginable velocity if he were moving at constant speed in a straight line, and if he were not exposed directly to the dynamic effects of motion relative to a fluid medium.

If one refers to the laws of motion equations in uniform, rectangular motion will be found to contain no term in time. Therefore, no term associated with the velocity itself could be applied to the body in a constant state of uniform motion in a straight line at any velocity.

On the other hand, if motion involves a change in velocity, or if it departs from a straight line, a force has been applied in the applicable direction.

When velocity changes, in straight-line motion, the rate of change is termed the acceleration. Since mass is always involved, the applicable equation is  $F = ma$ , or in other words, a force is brought into action which is proportional to the mass affected and to the linear acceleration imparted to it.

If a wave moving in uniform velocity in a straight line is caused to depart from that line and to go in a curve, a

\*Associate Professor, Dept. of Allergic Medicine, University of Southern California.

Acknowledgment is given by the author to A. M. Mays for several helpful discussions, to H. W. Crosswell and R. M. Francis for assistance in the preparation of the charts, and to H. F. Bell for assisting in carrying out the tests of Austenitic Marbles (25).

### Explanation of Chart

Plotted on log-log graph layout is the equation for velocity  $V = gt$ , where  $g$  is acceleration in multiples of the car's gravity,  $t$  time in seconds, and values,  $g$  is in g per hour. Also plotted is the equation for distance:

where  $S$  is stopping distance in feet,  $V$  is velocity in miles per hour, and  $t$  is a given time in seconds.

The X-axis is time in seconds; the Y-axis is either force or multiples of G (gravity) at stopping distance in feet. The diagonal vectors, bars labeled velocity or acceleration in time are used for acceleration in G, while the vectors in stopping distance or time bars are used for stopping distance in feet.

Sample run of the chart. An airplane makes an emergency landing in a rural field. Velocity on contact was 100 mph, and stopping distance was 120 ft. Following the 100 mph line on the velocity vs. stopping distance to time graph, we find that it takes about the 100 ft line at 1.4 sec. Along the 1.4-sec. line upwards the 100 mph line of the velocity vs. acceleration vs. time graph at 3.25 G, missing uniform deceleration.

Since the pilot was tested upright, we know that the force was transverse

to his long run and will before his limits of tolerance in danger in Lane A.

Line A shows the approximate transition of normal polymer to low-density G. (amorphous)

Line 3 shows the approximate tail area to positive  $G$  (head to foot) noted.

Line C shows the approximate tolerance to negative C (lost to land) used. (There are indications that line C should model line B.)

Point D shows the second tolerance provided by Gmail plus starting by the individual.

The three points at E are caused by survival from falls from high places. In each case the individual landed

usually list on some peeling substrate, such as earth and, although based on self-healing, in some cases suffering broken bones, did survive. In each of these cases the severity of exposure and subsequent damage was much more extensive than illustrated in the human experience.

The sheet can be used to determine the stopping distance, the G, or the time of one of these plus the velocity upon impact is known. It can also be

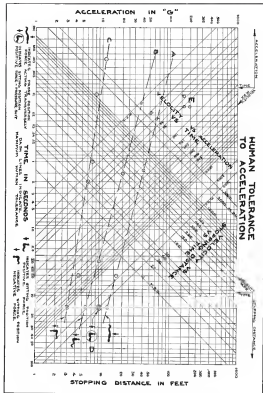
used for acceleration values determination.

Human Tolerance to Acceleration

Prediction	Apprehension Tolerant	Total Tolerant	Source of Information
Scared + G	+ 6.3 (+)	15 sec	Ref 12
	+ 1.0 (+)	1 sec	Ref 7
	+ 9.0 G (personnel)	15 sec	Unpublished (USC)
	+10.0 G	30 sec	
		30 sec	Ref 6 (Navy)
Scared - G	- 3 G	75 sec	Unpublished (USC)
	- 6 G	9 sec	Ref 1 (Air Corps)
	- 10 G	9 sec	Ref 7 (Air Corps)
	- 8 G	0.9 sec	Ref 7 (Air Corps)
	-10 G	8.00 sec	Ref 7 (Air Corps)
Tolerant G	15 G person	4 sec	Unpublished (USC)
	10 G (personnel)	Ref 9 (personnel)	
	10 G (person)	16 sec	Unpublished (USC)

circular path having a given radius from the axis of rotation, it exerts an outward force expressed by the equation

Delaney stated, the fence marked



## Who was First?



**WHO WAS FIRST** to apply the principles of the parabolic movement and showed by Leonardo da Vinci in 1514? *Answer:* In 1911 Leonardo jumped from the tower of the Montefiore Observatory in Italy on each hand an umbrella of 3 ft. diameter.



**WHO WAS FIRST** to apply the principle of lift derived by diving in a curved surface horizontally through the air? *Answer:* Sir George Cayley built the first model of man carrying glider in England during the 19th century.



**WHO WAS FIRST** to apply the principles of air pressure to form a curved surface? *Answer:* The Wright Brothers developed the idea of internal control through flying wings and rubber manipulation in 1903.



**WHO WAS FIRST** to apply the principles of the Tumbler Wheel, which convert rotary into reciprocating motion, in the design and construction of a sliding gun door of what for aircraft application? *Answer:* Wm. E. Whittaker Co. in 1942.



Who also patented and produced the first sliding gun door of what for aircraft application? *Answer:* Whittaker Co. in 1942.

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externally (centrifugal force) is proportional to the mass and to the square of the velocity along the curve, and is inversely proportional to the radius of the curve.

**Acceleration:** The equation for centrifugal force, then, is that the force is proportional to the square of the velocity.

However, the term  $\frac{v^2}{r}$  is actually a measure of the rate of change of velocity away from a straight-line path and therefore, by definition, an acceleration although a difficult one to visualize. We therefore speak of the associated force as being due to radial acceleration.

To the two accelerations, linear and radial, we may add a third—angular acceleration, which is a measure of the rate of change in rotation or angular velocity.

The equation applying to this type of acceleration is  $F = L \times A$ , in which  $F$  is force,  $L$  is distance from the center of rotation, at which the force is applied, and  $A$  is rate of change in angular velocity, and  $L$  is the moment of inertia of the mass involved.

In the case of linear and angular motion, it is common for engineers to speak of increase in velocity as acceleration and decrease in velocity as deceleration.

### Physiological Considerations

In aviation medicine it is common practice to speak of the forces due to acceleration in terms of "G's" in the equations applicable to gravitational acceleration having the symbol " $g$ ".

The weight of an individual as we commonly use the term, is the force is provided by gravity at "1 G" acting on the mass of the body.

In aircraft and in sport testing we choose, if it is possible to subject the human as well as equipment to acceleration at higher magnitudes for appreciable periods of time, say several seconds.

Since  $F = m \times a$  or  $\frac{W}{g} \times a$ , an increase in acceleration to twice that due to gravity would double the force. ( $G_2 = \frac{W}{g} \times 2a$  and since  $a = g$  then  $F = \frac{W}{g} \times 2g$ ). Thus, at 2 G the force or up-pull weight is doubled.

Similarly, we could say that at 10 G the force or weight is tenfold. The means that a pilot sustaining a 7 G maneuver, as in a pull-up from a dive, exerts a force against the seat of the plane of seven times his normal weight, instead of one, by radial acceleration acting on the mass of his body.

We likewise speak of G forces in linear acceleration and deceleration. If we speak of a 20 G deceleration during a crash we mean that the rate of change

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of velocity has been twenty times that which would be caused by gravitational forces.

**Action on Body.**—The magnitude of these forces in the human body is apparent when we consider the area over which they act. As the area becomes smaller, the pressure becomes larger, and as localized pressure increases a level is reached which is destructive.

Degree of destruction as well as the extent depends upon the physical characteristics of the tissue involved, and amount and duration of the pressure.

Consider, for example, the effects of a 200-lb. force on 4 sq. in. of limb and the effects of the same force on 4 sq. in. In the first case, the pressure is 50 ps, in the second, 1000 ps. The latter would be destructive.

Effect of force upon the body depends on the direction of application in relation to the magnitude of the force, as well as on the site and area of application.

If the force is large, but acts for only a very short time (from a fraction of a second to a few minutes), the permanent effect will be due to locally-applied pressure.

If this acts upon soft tissues, pressure waves may be generated whose nature will depend, in part, on the velocity of the agent causing the force, the kinetic energy of the agent and the area of contact.

These pressure waves will travel through the unaffected area of the body and will produce a local destructive effect upon the structure and function of the tissues traversed. If the force acts upon the skeletal structure, local destruction may be caused.

**Large Force, Brief Application.**—As the magnitude of the force increases, the direction of application becomes more of a transition into the field of soundings by motion.

Motion produces a high degree of fluid tissue destruction, depending upon many factors beyond the scope of this discussion.

However, rate of transmission and magnitude of shock waves into the skeleton of animals from a main or the thigh has been determined, and shows a velocity of propagation of pressure waves to be approximately 4,200 ft/sec.

If we consider the effects of a very brief application of a large force to the head, we are confronted by two experimental observations: (a) Acceleration of 100 to 200 G cases concussion; (b) absorption of 200 in-lb of energy in a brief period of time causes fatal damage to the brain.

These observations are only approximate since (a) the force acted for approximately 0.25 in., yet may have caused the acceleration in 0.01 in. while (b) the absorption of 200 in-lb of

energy may have occurred in either a fraction or a multiple of a millisecond.

**Body Position.**—When forces are applied for a longer time we must consider the manner and direction of application relative to the body.

When the force is directed from the head to the feet the acceleration is said to be positive; from the feet to the head, the acceleration is negative.

When the force is directed transversely through the body, acceleration is said to be transverse and is further classified by the position of the individual. If the force is directed from the back toward the stomach, the individual is said to be in a prone position. If directed from the stomach toward the back, the individual is said to be in a supine position. If the force acts from side to side, he is in a lateral position.

Obviously there is a possibility of a combination of the various positions such as prone-prone, in which the individual is between the vertical and a prone position, as well as a semi-prone position in which the person (lying on his back) is somewhere between a supine and a vertical position.

There is also a transverse position in which he is more or less doubled up with his knees close to his chest, with the direction of force due to acceleration usually from head to feet.

**Action of Blood.**—All of these positions are important in considering the effect of application of positive (head to feet) force due to acceleration, since the height of the column of blood between the head and the lower extremities in the direction of force, determines the amount of acceleration which can be tolerated for relatively long periods of time—say three seconds or more.

If the hydrostatic pressure caused by this column of blood is greater than the blood pressure (at lower level) generated by the heart, the acceleration through the brain will be arrested. When the pressure in the blood generated in the capillaries of the brain is said up to be the unique tissue the brain will cease to function. The individual will exhibit changes in performance of all nervous system, progressing rapidly from prepolynomial to complete unconsciousness.

Regardless of the magnitude of acceleration, up to 9 G (head to feet), which deprives the brain of circulation, there appears to be a period of time of approximately three seconds during which the brain will tolerate. The average individual will have the circulation through the brain arrested at approximately 4.5 to 5.5 G unless there is an additional force acting the least in maintaining a sufficient level of pressure.

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feel poorly will lower these levels. A state of well-being under comfortable conditions is essential for maximum resistance.

Red-out or strap red has been associated with exposure to insect G and apparently has been experienced by some pilots in outside loops and push-over.

The loss for red-out is obscure, as suggested by one investigator, it is caused by the lower eyelid coming up over the eye. Strong light alone and through the eyelids and would be more noticeable during insect G since the lower lid has no muscle to retract it from over the eye.

Man's limits of tolerance in aviation have been summarized in the accompanying tabulation and graphs. The data, in general, came from experiments on young healthy male adults, and should be interpreted as the tolerance of an average individual of that group who is actively trying to meet the effects of the applied forces where possible.

This is particularly true in considering the effects of plus G for 15 sec. since a relaxed individual might collapse at plus 4-5 G, yet be alert at plus 7 G while meeting the stress by straining both leg and abdominal muscles. These limits are physiological limits and must not be confused with psychological limits.

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## Future of Engineers In Industry Surveyed

A recent survey aimed at explaining the future position of engineering specialists in American industry should prove of interest to the various specialized engineers, which data were presented from a wide range of industrial classifications for broadly diversified phases of research, design and production.

Engineering colleges, too, should find in this study opinions that are more valuable for future planning.

Conducted by Alexander Polytechnic Institute, Troy, N. Y., the analysis represents the views of 150 representative engineers.

**Increased in Income**—Although in industrial production is at the highest percentage level in the nation's history, 70 percent of the executives think the demand for engineering specialists will continue to increase during the next ten years. The remainder are not so optimistic in the near future.

And 90 percent believe that there is a growing demand in industry for executives and managers with engineering

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background. It is revealed that approximately 15 percent of the executive and managerial positions in the 510 aerospace firms represented are now held by engineering graduates.

Nearly one percent say that college graduates should continue to stress thorough grounding in basic principles at their major function; that equipment should be kept up-to-date and modern production methods be shown in the lab as taught in cooperation with industry.

Help from industry—both for present and future—should help meet increased costs while progressive education exists.

In outlining ways in which support can best be secured, 150 respondents said that grants should be given to colleges either directly or through associations of industries. Another 755 believe that as industry progress can underwrite the cost of equal progress in departments doing work related to its field.

Some advanced brand programs of cooperative work and study, while often believe that industry should greatly increase its awards of scholarships and fellowships in the colleges. A recent example of such assistance is that of the fellowships established by Boeing Hughes in positive aerospace at California Institute of Technology (Aeronautics Week, Jan. 3).

The 75 percent who believe teachers are underpaid say that the colleges will have to offer salaries more nearly comparable to those paid in industry if they are to obtain top flight personnel.

One of those quoted, James H. McGinnis, Jr., president of McGinnis and Publishing Co., New York City, said that educational support by industry and business "is a matter of self interest on the highest plane, as an adequate supply of well trained men will be necessary if we are to maintain and improve our position in an industrial nation."

### Radar Beam Hazard

Radar beams can set fire to aircraft fuel, according to the results of a test program conducted by the fire department of the North American Co. Standard SCR-720 and APC-25 radar units were tested at ANF-11 grade gasoline, and the fuel was ignited at distances of less than 25 ft. when metal objects were in the beams.

The pulse energy is paid up by any good conducting material, such as a steel tank, lead pipes or lead (the potential) set to the ground, setting fire to the gasoline.

The tests also indicated the possibility of light metals being heated by radar beams to temperatures high enough to ignite fuel vapors.



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- Free rinsing! No white residue! No streaking!—even when used with hand sponges.

Cee-Bee announces the "Improved A-3" aluminum surface brightener. It is much safer than any other similar material ever developed; does a first job of oxide removal, of cleaning and brightening.

**ABSOLUTELY SAFE** Northrop Aircraft Research Laboratories have made comprehensive tests on Cee-Bee A-3. Results prove complete safety on 24ST and 35ST aluminum, no effect whatsoever on primer in faying surfaces—even under extreme conditions. Write for complete data on this test.

Aircraft manufacturers state that the damage caused by corrosion and oxidation is many times more costly than proper cleaning. The use of the Cee-Bee A-3 Bright Cleaning methods eliminates heavy oxide and corrosion from under surfaces of wings, fuselages and stabilizers at surprisingly low cost. Find out about these Cee-Bee savings.

CHECK AND MAIL THE COUPON TODAY!

case story  
63

### Here's what this airline did—

- 1 Submitted the "Improved A-3" to laboratory tests for corrosion and effect on primer. Early recommendation for actual service use.
- 2 Service test performed on one DC-3 for under surfaces of fuselage and wings. Recommended for regular use for the purpose.
- 3 Due to satisfaction of above operations, A-3 is now used on complete DC-3's and Boeing Stearman's.

**Estimated Savings of \$10.23 per 34 man hours on each DC-3; \$53.50 and \$9.00 more hours on each Boeing Stearman are reported by this operator.**

**CEE-BEE**

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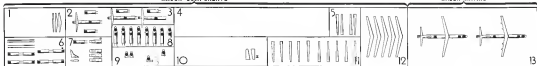
- ☐ Cee-Bee's Improved A-3 Report  
☐ Cee-Bee's Improved Cleaning Procedure using A-3  
☐ Results and savings of other users

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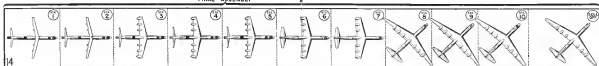
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FINAL ASSEMBLY



Shows how in two sections, main assembly building at Fort Worth. 4000 ft. Plant has 3,000,000 sq. ft. of good working space. From—where B-36 is produced—in 200-ft-wide bay stretching. Also designated are: 1, forward fuselage; 2, tail section; 3, tail primary; 4, production store; 5, wing outer section; 6, main bay; 7, tail; 8, main fuselage; 9, main; 10, wing outer section; 11, wing center section; 12, wing mating; 13, main mating; and 14, final assembly. Craft at end of bay in final assembly.

## How Convair Produces B-36, World's Largest Bomber



Mating horizontal stabilizer with inboard and tail section. At this station (left end of picture), all main bay section is mated on assembly to tail.



After 55-ft. communication tube is installed in main bay section, they are mated, one to one section, other to tail section, and placed in primary line.

"Line" gets the accent in Fort Worth production scheme featuring straight 5/6-mi.-run for mating of huge assemblies.



Tremendous stretch of plant's 220 ft. with a strikingly rounded in view from site of main bay fabrication. At upper right are some major assembly stations for main bay from structure. Area in foreground and at left is for subassembly.



Five workers, with last section clamped for supporting. Structure, safety of structure steel, a closely controlled overhead for proper plane fit.



Near-forward main bay primary line. In background, plus structure is being mated. In foreground at left main bay used to tail. (Continued on page 57)



## Blazers of the trail

Everyone who has ever flown has his eyes on Boeing's great new Stratocruiser as it soars up toward the commercial flight skies.

The reason is easy to see. For the twin-deck Stratocruiser indicates 22 years of trail blazing in aircraft design and production. Into its building has gone all of Boeing's vast wealth of knowledge, skill and experience.

Among its predecessors was the Boeing Monomail, introducing a design formula that's been followed ever since. Then it evolved the Boeing

B-27, America's first three-engine, all-metal transport. Then came the series spanning 214 Clippers, and the Boeing Stratoliner, first pressurized-cabin transport.

In the military field, Boeing leadership has been just as pronounced. The early B-1 bomber established the modern trend in bombardment aircraft. From it developed Boeing's great warplane lines, the B-17 and B-24, the new B-28 Superfortress and the rugged, new 600-mile-an-hour B-27 Stratojet.

Now, the Stratocruiser absorbs the design knowledge gained from development of the whole proud Boeing line. Already proved in exhaustive flight tests, this fastest, most powerful, most comfortable of all commercial transports will soon go into service as the airliner of the world.

- |                  |                         |
|------------------|-------------------------|
| A. Monomail      | P. Jet Bomber           |
| B. 247 Transport | Q. B-17 Flying Fortress |
| C. Stratoliner   | R. B-28 Superfortress   |
| D. 244 Clipper   | S. B-27 Superfortress   |
| E. Stratocruiser | T. B-27 Stratojet       |

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## As B-36 Approaches End of Line . . .



View that has the passing conditions. An inlet opening has been provided and removable leading edges modified with wings.



Overhead assembly, covering engine then up, hold up. Each engine is on track, goes through angle two in hold up cycle.



At end of line, craft are turned to final course for full wing span. 290 ft. Vertical tail extends up into and from area for clearance.



As completed B-36 moves slowly through door of assembly building, nose of plane is jacked up so that 47 ft. high tail is lowered to clear.

**when it  
all depends  
on a clamp**



**you can depend on MARMAR**



When it comes to

holding things together—under stress and strain, heat, pressure, vibration—you can really rely on Marmar Clamps and couplings. Whether for high temperature ducts, chemical-bonded air conditioning systems, or for supporting fuel tanks, gyroscopes and fuselages—no name put a few. Somewhere in this varied line is the answer to every fastening problem.

There is no more need for you to spend design time on a clamp than on a standard nut or bolt. Marmar's standard types will fill every need and can be specified as easily as standard nuts and bolts.

This versatile group of products is the result of years spent in the design of standardized units for every specialized application. Now manufacturers can turn these clamps and couplings designed right into their products saving design time and production money on jobs which once required individualized parts.

FOR INFORMATION WRITE DUPT-40



**MARMAR**  
PRODUCTS CO., INC.  
140 WEST FLORENCE AVENUE  
INGLEWOOD, CALIFORNIA



### Dynamotor "Canned" For Altitude Efficiency

A unique and compact dynamotor assembly has been developed by Bendix Aviation Corp., Red Bank, Pa. It is designed to solve economically the difficult problem of obtaining efficient operation of the altimeter, rotating electrical equipment at extremely high altitudes.

The dynamotor is housed in an ordinary No. 2 can—the type commonly used for vegetables—hermetically sealed to sea level air. Result is that the unit functions at sea level conditions and efficiency even though it is operating at great heights. Because the dynamotor is, normally, an unventilated device, no undue heating problems are created by confining it in a can.

A special valve is crimped in the seal to allow air to enter and exit, and a spring rubber bungee cap with end plate fasteners are provided on one end of the can and sealing it down with a standard machine having a modified chuck to accommodate them.

If repairs are necessitated, the dynamotor can be fixed with use of an ordinary can opener, then resealed in a vacuist furnace.

Supplier of the bearing, the Avcon Coin Cell Co., estimates that it will stand altitudes up to 200,000 ft. before rupturing from the pressure of the contained sea level air.

### Metric-Size Wrenches

Open end wrenches with metric-size jaws have been produced by Torab Tool Co., Los Angeles, for mechanics who routinely handle metric equipment. Opening size combinations, in millimeters, are 6 x 7, 8 x 9, 10 x 11, 12 x 13, 14 x 15, 16 x 17, 18 x 19, 20 x 22, 21 x 23 and 25 x 28.

## The New Firestone SKY CHAMPION LEAKPROOF TUBE

**HOLDS AIR  
4 TIMES  
LONGER**

**Greater Safety • Added Economy • More Landings  
Less Servicing • Fewer Tire Changes  
More Retreadable Tires**

**THE NEW** Firestone Sky Champion Leakproof Tube brings you all these advantages at no increase in price or weight. The tube is made of natural rubber, chemically treated on the inside to greatly improve its air-holding qualities. This means greater protection to the tire because it operates through a greater part of its life at proper air pressure, providing greater safety on landings and takeoffs. This also means reduced maintenance cost due to less frequent inflating and fewer tire changes. Because the tire body is protected against the hazards of underinflation, it may be retreaded for additional service.

Write Firestone, Aircraft Products Division, Akron, Ohio, for more complete information on this outstanding new product.

Listed in the Price of Firestone every Monday evening over NBC

Programs, 1948. The Firestone Tire & Rubber Co.

**No Increase in Price**

**NOT  
THIS**



**BUT  
THIS**



**Firestone  
SKY CHAMPION  
TIRES and TUBES  
Mean  
GREATER SAFETY**



Here a Cherry riveter pulls aluminum rivets in a top and head rivet, airplane assembly job.

## Cherry Blind Rivets MAKE THE HARD JOBS EASY



**FEES PRODUCTION PLANNING** Fastage, wing, tail, grooves, and other aircraft assemblies are finished faster with Cherry Rivets. There's no locking.

Only one step is needed. Drilling from one side of the work does away with those "blind spot" production problems.

**COMPARABLE TO SOLID RIVETS** Cherry Rivets have shear values comparable to solid rivets. But they are much easier to use any time, anywhere. They combine the strength of solid rivets

with a very simple fastening technique.

**VIBRATION-RESISTANT** Cherry Rivets have excellent hole-filling qualities and high clamping action between the shank of the rivet and the materials fastened. This gives Cherry riveted joints exceptional resistance to vibrational stresses.

**UNEQUALLED FOR MAINTENANCE WORK** In maintenance work, they're used alone, unmodified, easy to install, easy to remove. Easy to replace. They enhance the appearance of any job. Try Cherry Rivets today and give years of less expensive assembly work.



Cherry Rivets are made from aluminum, steel, or brass. Standard rivets are one-half inch in diameter and two feet apart. There is a wide range of grip lengths. Special heads, aluminum, grip lengths, and alloys are available to order. Write us today for further information. Address: Department A-100, Cherry Rivet Company, 121 W. Main Street, Los Angeles 12, California.



CHERRY RIVETS ARE APPROVED BY CIVIL AERONAUTICS AUTHORITY AND UNDERWRITERS' LABORATORIES, INC.

AVIATION WEEK, January 17, 1949

## NEW AVIATION PRODUCTS



### For Illumination Problems

"Light King", practical and in difficult lighting locations in hangars, ramps and factories, is portable combination of flood lamp and adjustable protractor ability light made by Keller Laboratories, Oswego, N. Y. Each light has 25 ft. cable, giving working radius of 52 ft. from instant outlet. Two outlets are cast aluminum alloy, plated and handle and are black, enameled steel. Single turn retract cable 2.5 ft. Low current at gravity and balanced 2-point standard give secure support. Unit may be moved from standard and mounted on wall or other location. Spotlight unit 150w. flood lamp, trouble light holder takes built up to 100w. Double outlet permits use of electric drill or other tool by illuminating flood lamp in trouble light. Wire is covered with special grease- and water-resistant material. Weight is 24 lb.

adjustable or manual operation. Model E25-1 portable, made by Black & Webster, Inc., 20 Mount St., Newbury 91, Mass., is suitable for staking, marking, wire cutting, blowing, forming and drawing of acrylic plastics, fabrics, leather, etc. Three reciprocating high temperature silicone-insulated coil in rugged solenoid which permits own tension operation at better than 170 blows per min., delivering impact of more than one ton. Device weighs 45 lb. and needs less than 1 sq. ft. of space.



### Sealing Action Washer

Washer giving effective positive and around screws, bolts, rivets, tubing, etc. tried wires and in hydraulic applications, is announced by Franklin C. White Co., 407 Commercial Center St., Beverly Hills, Calif. Known as Leak-O-Seal, device is small rubber-like instant ring encased by washable material serving to prevent compression of ring beyond elastic limit. It is claimed that seal will not deteriorate, but holding as well as sealing action may be broken, and provides some full metal threaded bearing surface as steel and stainless.



### Versatile Impact Hammer

Designed for wide range of work where speed and high production rates are important in field of automotive, semi-

### Dey Chemical Fire-Fighter

Portable for extinguisher announced by American-LaFrance-Fire-Fighter Corp., Elmira, N. Y., is designed to adjust long range and duration of operation and water composite discharge of chemical material. But has all material excepting gun connection, built on safety dial, and a light in weight. Chemical is non-toxic, non-corrosive, non-conductor of electricity, and will not freeze. It is recommended for liquid and chemical fires.



### Comfortable Headset

Two-earner headset, developed by Telex, Inc., 1635 E. 8th St., St. Paul, Minn., is reported to weigh only 1.6 oz. Each receiver is positioned, put above ear and is connected to cable adjusted, metal sounder by locking individual socket just so that only small plastic tips enter ear openings, thus eliminating pressure and chafing. Sound source may be removed from ear without removing receiver from head. Single and connection can be plugged into either receiver, or both headlined, made of 2-metal discs instead of 1-metal plate, can be bent or twisted for shaping into perfect or small components.



### Motors For Aircraft

Line of high frequency induction type aircraft motors, offered by U. S. Electrical Motors, Inc., 205 E. Main Ave., Los Angeles 54, Calif., operate in air and with synchronous speeds of 6000, 8000 and 12000 rpm. Available in sizes from 1 to 10 hp., they are 3-phase, high frequency, 400c. for either induction or synchronous drive. Light weight, light housing, are used, ball bearings are pre-packed. Units are air cooled with or without built-in fans. One type can be equipped with a built-in brake for instant stopping. Throttle device affords overload protection by automatic cutout upon failure of actuator after parts.

ENGINEERING

41

## What New Taxes Will Mean

President's proposal reflects administration thinking for business levies, but Congress has the last word.

The aviation industry will be vitally affected by the legislation enacted in Washington this year. While the President may propose various levies, it is Congress, in the final analysis which will write the conclusions to bills.

The outlook for all industries, particularly the aviation group, will be improved in the light of the President's recommendations. Such projections will progressively reduce to minimum, as the separate Congressional committees proceed to write their tax bills.

With this background, it may be well to remember that despite the initial hysteria likely to greet the Presidential tax recommendations, Congress will make the final determination in this respect. Further, the process promises to be fast and convincing.

► **What to Expect**—Under tax circumstances, it is virtually impossible to predict the ultimate form of tax legislation emanating from the 81st Congress. It is possible, however, to conjecture on the general scope of taxation surrounding the aviation industry, projected largely on government policies in effect during the last war and its recent periods.

The aircraft builder may be subject to the same profit limitations due to high corporate and excess profits taxes as was imposed on all enterprises. An important question, however, as pointed up in the special status the aircraft industry holds in its relationship to the government.

While the official holder has been exempt from special levies, the actual profits on aircraft contracts, at the same time the government is interested in increasing a healthy and financially self-sustaining industry. This was reflected in the recommendations advanced by both the President's Air Policy Commission and the Congressional Aviation Policy Board.

There then is strong reason to believe that even if excess profits taxes should be imposed on the aircraft industry along with other selected enterprises, considerations of this factor as a datum on revenues will be handled in the investigation process.

In other words, it is probable that consideration of profits for the aircraft builder will be dealt with full con-

sideration toward the final results, after action of all types.

► **Public Consideration**—Generally, the aircraft manufacturers are exempted as to the extent of profits they may retain on military contracts. The War Relocation Act, which provides for 12 percent of sales. There is no guarantee that this limit must be adhered to. In fact, it is rarely reached. The War Relocation Act of 1943, which applies to contracts in effect 1945, itself includes, within the process of strict restrictions in accepting reasonable and necessary costs as a military contract.

The agencies responsible for procurement of aircraft also have their own set of profit margins and allowable costs. It is believed in informed quarters that aircraft builders need be permitted to earn at least 4 percent on sales on all military contracts after taxes, under conditions of economical mismanagement. There is no assurance that such maximum return will be set and that the opportunity at least may be available.

In a number of instances aircraft companies will obtain special relief. During 1949 and 1950 under the current provision of the tax laws under which losses of the past two years may be applied against profits in the following two years.

► **Airline Facilities**—The airlines may be expected to accept a favorable position in the federal tax structure. The more favored position of the low loss or even with some greater loss, to a number of low airlines. Under this item, substantial tax credits as a result of heavier losses during 1948 will ease the tax impacts on available earnings for this year or 1950.

Through the last war aircraft was exempted from the excess profits tax to the extent of their war pay, and received exemption. With the single exception of Eastern Airlines, this provision returned the industry from the payment of any excess profits tax.

With federal policy directed toward the financial strengthening of the airlines, there is strong support for a similar exemption to be incorporated in new excess profits tax law that may be enacted.

Certainly the government would be seeking at cross-purposes with itself if on one hand it should exempt all or less earnings through heavy taxation and on the other support the industry through increased fiscal projects.

► **Eastern Credit**—As a matter of interest, it is significant that Eastern paid a total of more than \$15 million in excess profits taxes during the war years. Some industry observers were critical of the Eastern management in not spending more money as excess payments in order to reduce its tax liability. An informed view, however, holds that if the policy was followed, the close control of operating costs might have been impossible in the postwar period that followed.

A major consideration in government policy exists in the form of the confining excess taxes on transportation. When originally imposed, one of the main objectives of the transportation tax, in general, was to discourage unnecessary travel. A related purpose, of course, was to provide a new source of federal revenues.

The history of excess taxes on transportation is quite clear in the indication to maintain them only as a temporary measure. For instance, during the first world war, as more transportation tax was imposed effective Oct. 3, 1917, and was finally repealed on Jan. 3, 1922.

Effective Oct. 10, 1941, an initial 5 percent tax was imposed on all transportation of persons. This was increased to 10 percent on Nov. 1, 1942, and to 15 percent on April 1, 1946, which is now in effect. A 3 percent tax on the transportation of property was enacted effective Dec. 1, 1942, and continues in this day.

► **Airline Hard Hit**—The means for the original imposition of these transportation taxes no longer exist.

While all forms of transportation are affected, the airlines are hit the hardest by this tax. In attempting to broaden their markets, the air carriers must pass for lower rates to make these services more attractive to a wider circle of the public.

The amount of the 15 percent tax would offset the air carrier with greater flexibility in their passenger traffic. The government, in the long run, stands to gain by this repeal. This would stem from the fact that the more profitable the airlines are in their passenger service, the less the drain on federal funds through road subsidies. This is to use nothing of strengthening the air carrier in the interest of national defense.

It is doubtful if a better candidate in transportation can be found than the transportation carrier. The broad-based effects flowing from this repeal promise to more than offset the relatively limited revenues from this tax. —Selig Altschul

## PERFECTLY MATCHED-

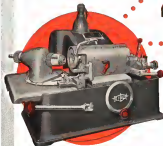
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# "MOST COMFORTABLE, ROOMY PLANE"...say Navion Owners



**"A BEASTLY TWO-SEATER PLANE CABIN."**—"Most comfortable"—"Relaxed and relaxing"—"Superb visibility"—are typical comments several hundred Navion owners give when asked what they thought of their planes. Every day more executives and professional men are discovering that the Ryan Navion is the ideal personal and business plane. There are good reasons. First, men are individually adjustable, comfortable in dash-free, improved

sound insulation and smooth-as-silk stability—even in rough air—give quiet relaxation. The exclusive roll-back canopy gives convenient exit and entrance for most-seat passengers. And there's loads of space for luggage or cargo. See how you can profitably use a Ryan Navion in your business or profession. Write us today on your letterhead for a free, fully-illustrated brochure, and ask about a free demonstration flight. There's no obligation



**"LIFT"—"EASY TO FLY"** was No. 1 on the long favorable list of comments about the 150-hp Navion. Almost every owner reported Navion's effortless flying and the pleasant attention to detail and comfort control that permits relaxing with relaxed ease. You get no matter what you need it. This truly means a new era in the air, dependable Navion certainly flies itself!



**"BIGGER"—"DON'T HAVE TO SAY IT!"** "You really like it"—these were high on the list of Navion owner comments. The ability of the dash-driven, all-metal Navion to withstand heavy duty punishment, all kinds of weather, no high or unpleasant fields, is one big reason why Navion owners fly anywhere they want to go—and it is so cheaply in doing so!



**"SHORT FIELD PERFORMANCE—THE BEST"** was an almost unanimous comment from Navion owners. Navion delivers the slowest, steepest landings of any plane in its class. High lift, full deflection flaps, fully flexible gear with wide wheel travel and cushion tires, variable wheel-tilt, and high ground clearance make for gentle, solid landings even in cross winds.

The Thoroughly Proven Post-War Plane **Ryan Navion**

Rely on Ryan RYAN AERONAUTICAL COMPANY • 41 LINDBERGH FIELD • SAN DIEGO 12, CALIFORNIA

## AVIATION WORLD NEWS



the air during these surveys. Detailed maps and photographic images made up from these shots enable geologists to spot the shallow oil-bearing locations. The work is to involve about a dozen to be studied on the ground and will give an increasingly clear picture of the probable oil and natural-gas content of this part of the world.

The present survey is expected to yield 10,000 square miles to the area already mapped.

The Hunting Aerosols "Foghorn," used for a similar survey that began late in 1947, has had its new electronic parts installed and further to give better visibility.

Additional Pompey panels enable the photographer to see a little more "round the corner" and also increase his forward field of vision. The camera station has been moved forward slightly so that the photographer, who has grown like a basketball, can take photographs and release through the panel at the same time.

Another change is the installation of a partition separating the nose from the aircraft's hold, easing the problem of maintaining comfortable temperatures in the camera compartment at high altitudes.

► **From 22,000 Ft.—**The "Foghorn" is fitted with oxygen apparatus for operation at altitudes of 22,000 ft. By flying at this height, the survey party will ensure files by entering the zone covered by the camera.

The plane will carry out to five more than a ton of photographic equipment and other survey gear, as well as a ton of food.

Throughout the operation, the plane will be towed by a B-29 bomber. The overcast sky at remote fields may occasionally be obscured by bad weather. This is unusual, however, for the months during which the expedition will operate normally are quite good for air survey.

Reducing survey from base calls for a little organization. In 1947 the "Foghorn" reached aerodromes at points where fuel supply from B-29s in emergency of 600 to 700 gallons at a time in 44 gallon cans after a long journey by barge and land.

► **Hot War—At first** the expedition will work in ground temperatures of 77 to 83 deg. falling to 56 deg. at night. By the end of March, conditions become more agreeable, and at the end of May daytime temperatures have risen to 115 to 125 deg.

Under these conditions, it is difficult to stay at 10 to 10,000 ft. in order to "photograph," for the heat the aircraft has climbed to 20,000 feet or more, conditions have changed completely and after prolonged periods of high flying crews find themselves with-



Bristol Freighters are used in oilfield, geologic surveys such as this.



Photographer lies prone in the stripes to shoot through panel in modified nose.

## Searching for Oil in Iran by Air

New survey flights, using specially-equipped Bristol Freighters, will map 10,000 sq. mi. of Middle East.

LONDON—Prospecting for oil from the air again will get under way shortly in the Middle East. A specially modified Bristol Freighter of Hunting Aerosols Ltd. already has left England to undertake the job for the Anglo-Iranian Oil Co.

The operation is expected to last over a period of two or three years, with

the plane carrying out its own studies for its month out of each year. It is the sixth such aerial exploration Anglo-Iranian has conducted, the first being having been in 1916, 1917 and 1920 and the last two in 1945 and 1947.

► **New Maps—Large areas** of the Middle East have been photographed from

## LAMINUM\* SHIMS GIVE THE FULL SAVINGS OF SHIM DESIGN!



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**AS-THE-JOB ADJUSTMENTS.** No need for costly labor as operator the only tool required is a 1/16 inch to 1/2 inch or 0.002" or 0.001" shim.



**PREVENTION OF OIL AND PRESSURE LOSSES.** Fast with lubricated (oil) LAMINUM shim will also seal all in the bearings of high speed power-lubricated equipment.



**LESS "DOWN TIME" FOR THE USER.** Because of LAMINUM provides a permanent adjustment feature to allow for wear and pressure effect economy.

Send today for chart illustrating 46 money-saving, time-saving applications, detailed specifications, sample all LAMINUM.

### PRECISION STAMPINGS in any quantity

Let us quote on your difficult stamping jobs. Our experience, tools and presses are geared for close tolerance production.

Qualities like 1/16 to 1/2 inch (1/16 to 1/2 inch) are easily formed. Thicknesses of .001 to .002 inch and .001 to .002 inch are easily formed. Thicknesses of .001 to .002 inch are easily formed. Thicknesses of .001 to .002 inch are easily formed.

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THE GOLD STANDARD FOR SHIM

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SHIM

SHIM STOCK

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ANCHORING PLUGS

ing they were back on the ground.

The aircraft normally carries two people on each flight—pilot and copilot, photographer, radio engineer, and a captain of the house, Air Force, who is observer and—near the Persian Government is admission of all areas which are to be photographed—has the job of seeing that the aircraft does not fly outside the agreed limits.

Weather forecasts come from two sources—the R.A.P. station at Shush and personnel in the drilling areas who contact Alaska by phone every morning, giving details of clouds, wind, cloud formations and also, during January, February and March, advance on the possibility of occasional thunderstorms. After March, there is a two-month spell of fine weather, followed by a period in which heavy snowfalls are not infrequent.

► **Experience**—Last year's expedition was in the air for 450 hours and covered roughly 78,000 miles. After an aircraft at Abadan flies back to Kuwait to survey three areas totaling about 160 square miles for the Kuwait Oil Company. This comparatively small job lasted only three weeks and photographs were taken from altitudes of about 5000 ft. On the return journey to England the underlined survey work for the Cyprus Mason Commission and the Balkan Mining Company.

The previous expedition's experience proved the Bristol "Fighting" idea for aerial survey work, operating at high altitudes and giving the photographer plenty of room in which to do his job. Another attractive feature for an expedition on such a scale was its ability to transport the entire party and all the aircraft, ground, photographic and survey equipment required for an aerial operation across.

### From Planes to Trains

**BANGALORE, India**—India's only aircraft factory, which has handled a great diversity of projects since the U. S. Air Force stopped using it as a maintenance base at the end of the last war, has been given a major role in supplying the country's pressing need for railway rolling stock.

Still titled Hindustan Aircraft Ltd. although its aircraft work is negligible to aerial overhaul and assembly of British training planes for the R.A.F., it has been assigned a contract for 100 all-steel streamlined lightweight railway coaches built on "stream-line" aerodynamic principles.

The coaches were developed when the factory, which is owned by the Indian government, was still being operated largely under American contract management.



## Greater Blades for Bigger Jobs

### New—A New Blade Construction Principle Opens New Horizons for the Aeroprop

With the successful development of the obsolete blade principle, Aeroproducts announces another great stride forward—Aeroprops with tubular blades engineered for engines up to 30,000 horsepower.

There are two essential advantages offered by the Aeroprop with tubular

lar blades. It gives high power—output at high efficiency. It gives strength—weight ratio as compared to or better than those of ordinary hollow blade construction, yet it is available in larger sizes. Thus, the great advantage of horsepower may be said, within diameter limitations of present propeller manufacturing, while large blades for more powerful engines become feasible.

Tubular Bladed Aeroprops have passed all required military tests. Like all Aeroprops, they are pro-

duced with related features—reverse pitch, instant feathering, de-icing, etc. Models with applications up to 30,000 horsepower are in production or design.

Like all Aeroprops these propellers demonstrate again that Aeroproducts—backed by the vast research facilities of General Motors—can help today with your planning for tomorrow.



**Tubular Blade Gray Castings** (A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) (AA) (AB) (AC) (AD) (AE) (AF) (AG) (AH) (AI) (AJ) (AK) (AL) (AM) (AN) (AO) (AP) (AQ) (AR) (AS) (AT) (AU) (AV) (AW) (AX) (AY) (AZ) (BA) (BB) (BC) (BD) (BE) (BF) (BG) (BH) (BI) (BJ) (BK) (BL) (BM) (BN) (BO) (BP) (BQ) (BR) (BS) (BT) (BU) (BV) (BW) (BX) (BY) (BZ) (CA) (CB) (CC) (CD) (CE) (CF) (CG) (CH) (CI) (CJ) (CK) (CL) (CM) (CN) (CO) (CP) (CQ) (CR) (CS) (CT) (CU) (CV) (CW) (CX) (CY) (CZ) (DA) (DB) (DC) (DD) (DE) (DF) (DG) (DH) (DI) (DJ) (DK) (DL) (DM) (DN) (DO) (DP) (DQ) (DR) (DS) (DT) (DU) (DV) (DW) (DX) (DY) (DZ) (EA) (EB) (EC) (ED) (EE) (EF) (EG) (EH) (EI) (EJ) (EK) (EL) (EM) (EN) (EO) (EP) (EQ) (ER) (ES) (ET) (EU) (EV) (EW) (EX) (EY) (EZ) (FA) (FB) (FC) (FD) (FE) (FF) (FG) (FH) (FI) (FJ) (FK) (FL) (FM) (FN) (FO) (FP) (FQ) (FR) (FS) (FT) (FU) (FV) (FW) (FX) (FY) (FZ) (GA) (GB) (GC) (GD) (GE) (GF) (GG) (GH) (GI) (GJ) (GK) (GL) (GM) (GN) (GO) (GP) (GQ) (GR) (GS) (GT) (GU) (GV) (GW) (GX) (GY) (GZ) (HA) (HB) (HC) (HD) (HE) (HF) (HG) (HH) (HI) (HJ) (HK) (HL) (HM) (HN) (HO) (HP) (HQ) (HR) (HS) (HT) (HU) (HV) (HW) (HX) (HY) (HZ) (IA) (IB) (IC) (ID) (IE) (IF) (IG) (IH) (II) (IJ) (IK) (IL) (IM) (IN) (IO) (IP) (IQ) (IR) (IS) (IT) (IU) (IV) (IW) (IX) (IY) (IZ) (JA) (JB) (JC) (JD) (JE) (JF) (JG) (JH) (JI) (JJ) (JK) (JL) (JM) (JN) (JO) (JP) (JQ) (JR) (JS) (JT) (JU) (JV) (JW) (JX) (JY) (JZ) (KA) (KB) (KC) (KD) (KE) (KF) (KG) (KH) (KI) (KJ) (KK) (KL) (KM) (KN) (KO) (KP) (KQ) (KR) (KS) (KT) (KU) (KV) (KW) (KX) (KY) (KZ) (LA) (LB) (LC) (LD) (LE) (LF) (LG) (LH) (LI) (LJ) (LK) (LL) (LM) (LN) (LO) (LP) (LQ) (LR) (LS) (LT) (LU) (LV) (LW) (LX) (LY) (LZ) (MA) (MB) (MC) (MD) (ME) (MF) (MG) (MH) (MI) (MJ) (MK) (ML) (MN) (MO) (MP) (MQ) (MR) (MS) (MT) (MU) (MV) (MW) (MX) (MY) (MZ) (NA) (NB) (NC) (ND) (NE) (NF) (NG) (NH) (NI) (NJ) (NK) (NL) (NM) (NO) (NP) (NQ) (NR) (NS) (NT) (NU) (NV) (NW) (NX) (NY) (NZ) (OA) (OB) (OC) (OD) (OE) (OF) (OG) (OH) (OI) (OJ) (OK) (OL) (OM) (ON) (OO) (OP) (OQ) (OR) (OS) (OT) (OU) (OV) (OW) (OX) (OY) (OZ) (PA) (PB) (PC) (PD) (PE) (PF) (PG) (PH) (PI) (PJ) (PK) (PL) (PM) (PN) (PO) (PP) (PQ) (PR) (PS) (PT) (PU) (PV) (PW) (PX) (PY) (PZ) (QA) (QB) (QC) (QD) (QE) (QF) (QG) (QH) (QI) (QJ) (QK) (QL) (QM) (QN) (QO) (QP) (QQ) (QR) (QS) (QT) (QU) (QV) (QW) (QX) (QY) (QZ) (RA) (RB) (RC) (RD) (RE) (RF) (RG) (RH) (RI) (RJ) (RK) (RL) (RM) (RN) (RO) (RP) (RQ) (RR) (RS) (RT) (RU) (RV) (RW) (RX) (RY) (RZ) (SA) (SB) (SC) (SD) (SE) (SF) (SG) (SH) (SI) (SJ) (SK) (SL) (SM) (SN) (SO) (SP) (SQ) (SR) (SS) (ST) (SU) (SV) (SW) (SX) (SY) (SZ) (TA) (TB) (TC) (TD) (TE) (TF) (TG) (TH) (TI) (TJ) (TK) (TL) (TM) (TN) (TO) (TP) (TQ) (TR) (TS) (TT) (TU) (TV) (TW) (TX) (TY) (TZ) (UA) (UB) (UC) (UD) (UE) (UF) (UG) (UH) (UI) (UJ) (UK) (UL) (UM) (UN) (UO) (UP) (UQ) (UR) (US) (UT) (UU) (UV) (UW) (UX) (UY) (UZ) (VA) (VB) (VC) (VD) (VE) (VF) (VG) (VH) (VI) (VJ) (VK) (VL) (VM) (VN) (VO) (VP) (VQ) (VR) (VS) (VT) (VU) (VV) (VW) (VX) (VY) (VZ) (WA) (WB) (WC) (WD) (WE) (WF) (WG) (WH) (WI) (WJ) (WK) (WL) (WM) (WN) (WO) (WP) (WQ) (WR) (WS) (WT) (WU) (WV) (WW) (WX) (WY) (WZ) (XA) (XB) (XC) (XD) (XE) (XF) (XG) (XH) (XI) (XJ) (XK) (XL) (XM) (XN) (XO) (XP) (XQ) (XR) (XS) (XT) (XU) (XV) (XW) (XX) (XY) (XZ) (YA) (YB) (YC) (YD) (YE) (YF) (YG) (YH) (YI) (YJ) (YK) (YL) (YM) (YN) (YO) (YP) (YQ) (YR) (YS) (YT) (YU) (YV) (YW) (YX) (YZ) (ZA) (ZB) (ZC) (ZD) (ZE) (ZF) (ZG) (ZH) (ZI) (ZJ) (ZK) (ZL) (ZM) (ZN) (ZO) (ZP) (ZQ) (ZR) (ZS) (ZT) (ZU) (ZV) (ZW) (ZX) (ZY) (ZZ)

# Aeroprop

DESIGNED FOR THE AIRCRAFT INDUSTRY  
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The Aeroprop is available in single or dual rotation with instant feathering, reverse pitch, de-icing, etc. and all other features required for use in aircraft. Propellers, both and blade construction are designed for maximum efficiency in operation. It is strong, light and simple.

AEROPRODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO

AVIATION WEEK, January 27, 1949





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#### LOW TENSION

Aircraft cable with copper conductor  
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#### HIGH TENSION

Aircraft cable with copper conductor  
Specification ABC 111

Stranded aircraft cable  
Specification ABC 118

Aircraft twisted cable with copper conductor  
Specification ABC 111 and ABC 118

Aircraft ignition cable with standard steel wire  
Specification ABC 111, 112, 113 and 114

Aircraft ignition cable with copper conductor and  
tempera shield to withstand specification

## SALES & SERVICE



Two views of the Midget Mustang, now being new production at Schenectady Aircraft, Elmira, N. Y., as a personal and sport plane, show the high performance design of the small one-place which took it to the front of 1939 Gasoline Trophy race. Designed

and flown by Dave Long. Five engines, the all used 15 hp plane shown in three pictures in top position, third (15 ft 6 in) wingtip, (wingtip) landing gear with shock-absorbers and torque engine cooling fans.

## Sportplane Priced Under \$5,000

Modified single-seat racer boasts high cross country performance at extremely low operating cost.

By Alexander McIsaac

How many buyers are there for a new high-performance diamond single-seat sportplane priced at under \$5,000? Schenectady Aircraft Corp., Elmira, N. Y., and Dave Long, Port Huron, are seeking an answer to this question. Schenectady has started production of the such plane, a lightly modified version of Long's "Midget Mustang" which he raced in the 1938 Gasoline Trophy Race at Cleveland and in the 1939 Gasoline Trophy Race at Miami.

First origin CAA office at New York, yet it has not yet received request for commercial certification of the Midget but expects it. As a racing plane the prototype proved an exceptional success. Analysis of the plane's characteristics and construction is reported.

How no obvious reason why it could be termed a commercial failure. • Craft Redesigned—Last week Long flew his prototype P Mustang now a diamond "Midget Mustang", in Miami from Jack Hays for the first part of a demonstration in cross-country characteristics and its capacity in the Continental Trophy Race. He flew the 1150 miles in 7 hr 20 min averaging 160 mph with heavy headwinds, he reported. From Jack Hays to Richmond he averaged 180 mph. The plane is capable of high speeds over 200 mph.

In the Continental final Long should finish with a speed of 160-165 mph. For additional details see Miami News or Broward News articles. Last fall at Cleveland Long pulled his plane out of the final Gasoline race at the crash by because of a fuel vapor lock.

Long's performance figures for the Midget Mustang show it capable of high speed exceeding 200 mph, normal cruising of 170 mph, landing speed of 51 mph with flap and rate at climb at 1340 fpm. At cruising rates the plane burns 6.5 gal/hr and tank holds 15 gal. Production version will carry a 15-gal capacity baggage compartment behind pilot's seat.

Powered by a Continental C15 DT engine (with fuel injection) which runs a fuel pump. Schenectady wing propeller with choice of propeller for best rate of climb or best speed on the level.

Plane has 15 ft 6 in wingspan, is 35 ft long and 4 ft 6 in high. It is designed in Traditional Flying Plane Area, specifications for 150 cc in displacement engine power.

Two Mustangs—Long and Schenectady are two Mustangs for the Midget Mustang on a streamlined three and racing plane and a high performance cross country plane which operates at extremely low direct cost.

On arrival at Miami, Long said his prototype plane is a California better subject to delivery after the race.

Wing is a late type, however flow on last section with maximum thickness at 40 percent of chord. A 2 to 1 taper ratio is used. Two degrees of washout incorporated, in wing plus differential aileron twist applied to provide positive aileron control throughout the stall. The design data. Wing area totals 69 sq ft three ft more than minimum 787A requirement, and preliminary plane weight not much more than the 500 lb maximum Goodyear weight limit, requirement.

One of the modifications on the production plane is a new attachment to equipment for the spring steel landing gear. Gear strut attached to a tension brace supports with piston through a support bearing in the main spar and extends off to a rigid attachment at the rear spar. New arrangement takes all the gear outside the propeller stream, reduces the length of exposed strut and increases wheel load, improving brake control and lowering ground bounce tendency.

Full Size—Continental 500 x 5 mm and wheels and axle diameter are used. Instead of a wheel, the Midget Mustang, like the prototype and the most of the Goodyear team, will have a tail wheel. It is a spring leg and resembles shoe type tail attached at the bottom fuselage structure.

Conventional steel control and saddle controls with two-ported hydraulic brakes are provided. A three-position dual control lever at lower left side of cockpit operates push-rod structure flap mechanism.

Fuselage is monocoque structure with seven bulkheads spaced at seven dis-

doors, flush-mounted. One-piece windshield plastic canopy is attached to shock-mounted canopy steel tubular frame hinged so that pilot may enter or exit from either side, and so that he may observe the canopy as it pivots in or flight by opening both latches simultaneously. One forward bulkhead behind pilot's seat provides maximum protection. Quick release safety belt and shoulder harness is provided.

New wingtip over-though structure is a heavily reinforced bulkhead which is located at intermediate panel station.

Wing panels are attached to fuselage by two brace bolts at front span and a single hinge bolt at the rear span. Chord section front and rear spars are reinforced by laminated composite, nose ribs and center ribs. Wing is reinforced at rack seat to form a unitary. Shock-mounted shock absorbers are attached to wing tips. All control surfaces are all metal construction. Rudder and ailerons are cable operated. A double acting spring loading system, convertible from cockpit positive longitudinal trim.

General adjustable tabs are provided on rudder and ailerons.

Engine is attached to steel tubular frame by four bolts through rubber shock mountings which are attached to firewall bulkhead by four bolts. A single traffic cooling intake provides adequate cooling over entire engine condition.

► **FOATC.** Pilot-Long served in Air Transport Command is in pilot duty in the air on line of aircraft for the recent boom Piper, where he has been a design engineer since 1917. The P-350 was a significant hobby development of his own modified to meet the special requirements of the Navy. Many specifications have been set, increased.

Schubert has had considerable experience building complete aircraft and accidents in small size. In addition to the well known aircraft Scheraga model 1-21 airplane which won the 1947 national soaring championships and many other gliders, the company is currently subcontracting to build a new four-place aircraft, the Air Force glider and cargo plane, and has previously built submersibles and assemblies for Republic, Curtiss Wright, Fairchild, Boeing and others. The company also makes various non-aerobically powered, climbing aircraft models and gliders.

Passably, the critical production order of five Midget Mustangs will be followed by a larger order in soon as commitments are received for the first phase.

The seventh flown from Los Angeles to Miami placed among the winners of the Midget race.

## BRIEFING FOR DEALERS & DISTRIBUTORS

**GI CADET TRAINING**—Foster sent out by Lt. Gen. David H. Edwards, USAF, deputy chief of staff for personnel, saying GI flight training students to see their way to the Air Force, are being deployed at a number of reports at the request of Gen. Edwards.

American, USAF, is about the Washington Veterans Administration headquarters whether a trainee's interest to seek USAF flight training would be considered a possible point of his intent to make aviation his career. Sam Cook, head of registration and research services, replied that Air Force cadet training was much different from GI flight training, that there was no need at all apparent for cadet training to take the other training to get a definite "yes" or "no" in the question.

He stated that "as far as he knew" the new USAF portion did not indicate any coordinated course in VA to coordinate additional GI flight training.

**NEW AUTO PILOT**—A lightweight automatic pilot for small airplanes, designed by Bert Carlson, is going into production at Aero Industries, Inc., Cleveland, Ohio. Carlson and Berck engineers are investigating the possibilities of adapting the pilot to their own planes, and are checking experimental prototype articles.

Carlson believes there is a potential market for at least 10,000 of the automatic pilot light planes now in use, and Aero Industries is planning an initial production quantity of 2500.

**BOWMAN BUYS PATENT**—Pushman, of Patfinder Flying Service, Inc., of Shoshone, Calif., by R. P. Bowman Co., Oakland, Calif., has consolidated two of the biggest west coast personal aircraft distribution companies.

R. P. Bowman, head of the company bearing his name, and that head operating for the Cessna distribution purchased by the transaction would be moved from Shoshone to Oakland. In addition to the eight Cessna dealers in various California and Nevada cities now operating, other dealers are expected to be appointed soon.

The two companies will continue to operate with separate identities, with Bowman, a veteran of 31 years in aviation, and with more than \$2,500,000 in personal plane sales on his record, as chief of the consolidated operation. Bowman's announcement did not indicate interest of Henry Van Ruy, former boss of the Patfinder organization.

**EXPANDING SPRAY PROJECT**—Severe of the aerial spraying project for blackfly control in an Alaskan area now has been, rising worldwide. A DDT label aerial spray administered by a Bell helicopter, has led to doubling the usage to be treated next year.

In the original operation, in the Alaskan Coast, N. Y., a 4000 acre tract was sprayed, according to Seattle, Vietnam Oil Co., manufacturer of the plane. The same areas of three applications at intervals of approximately 10 days in June, totaling over 100,000 of a gallon of sprays and three-quarters of a pound of DDT to each acre, and nearly two million gallons of 90 to 95 percent of the blackfly population at a cost of about \$2.25 per acre.

Small owners in the area treated said they experienced capacity registration in June in comparison with 40 percent of capacity in the preceding June. Phase this year cost for treatment of 5000 to 10,000 acres.

**EDO CONTINUES IN FLOAT BUSINESS**—Earl D. O'Brien, from director and president of Edo Corp., and now vice president of American Wreckage, has been denied license that Edo is out of the boat business.

While the College Point, L. I., Edo plant has been concentrating heavily on Air Force, Navy and Army contracts, it has an "industrial" entry of standard boats on hand" and has received production on Model 1000 boats for the American Sales and Model 1470 boats for the Coast 195.

Sales division for boats has been consolidated into the Edo general sales department. "We have been in the boat business 23 years and intend to remain it," O'Brien stated.

—ALEXANDER McSURE

## LETTERS

### Footnote to a Footnote

M. A. Mankin's letter in *Airways* 11/11/51 for Dec. 27' 51' 52' 53' 54' 55' 56' 57' 58' 59' 60' 61' 62' 63' 64' 65' 66' 67' 68' 69' 70' 71' 72' 73' 74' 75' 76' 77' 78' 79' 80' 81' 82' 83' 84' 85' 86' 87' 88' 89' 90' 91' 92' 93' 94' 95' 96' 97' 98' 99' 100' 101' 102' 103' 104' 105' 106' 107' 108' 109' 110' 111' 112' 113' 114' 115' 116' 117' 118' 119' 120' 121' 122' 123' 124' 125' 126' 127' 128' 129' 130' 131' 132' 133' 134' 135' 136' 137' 138' 139' 140' 141' 142' 143' 144' 145' 146' 147' 148' 149' 150' 151' 152' 153' 154' 155' 156' 157' 158' 159' 160' 161' 162' 163' 164' 165' 166' 167' 168' 169' 170' 171' 172' 173' 174' 175' 176' 177' 178' 179' 180' 181' 182' 183' 184' 185' 186' 187' 188' 189' 190' 191' 192' 193' 194' 195' 196' 197' 198' 199' 200' 201' 202' 203' 204' 205' 206' 207' 208' 209' 210' 211' 212' 213' 214' 215' 216' 217' 218' 219' 220' 221' 222' 223' 224' 225' 226' 227' 228' 229' 230' 231' 232' 233' 234' 235' 236' 237' 238' 239' 240' 241' 242' 243' 244' 245' 246' 247' 248' 249' 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EMPLOYMENT • BUSINESS • OPPORTUNITIES • PLANES • EQUIPMENT—USED at RESALE





## LETTERS

### Comments on Helicopter Editorial

Following an letter commenting on *Aviation Week* editorial Jan. 1, "Let the Helicopters Be Merry Copies!"

Your editorial is a confection. I feel that encouragement to the worldliness of but as you state, willingness to change comes as which you believe. The letter of the fact is not impractical to me make a man who must be content on a "first response" month of his past years and which is to be decided today as my own. I would rather take my chances on the first group of right. I think you have done that in the editorial.

The military mission showing the last night from their view as not only empty. We need to involve bodies as we do ourselves. We were apparently satisfied to have a little as progress when *Aviation's* last night was thinking is better than.

The month was that building as a big way as both jet and rocket propulsion. Rules may be another example.

Now comes the helicopter, and very one developed, with maximum ability for military purposes, as well as commercial, and we are ignoring its military application almost as much as we did jet.

This is the way, in some local connection where as many come no other riskily will be of a very low (because of military and domestic) and as a result, work, in low flying spotting and observation, work, in over crisscross, and is held mainly generally there is warfare, which can be more complex with this letter.

And yet it wasn't primarily what a "rule" is, or how many personnel already all of the aviation industry, all this time. I think the helicopter should be shown as the use of the transport in military strategy but as an idea that we can conceive for ourselves as far as the interesting projects of the helicopter are concerned.

I think that first of all of a new idea by Congressional committee at the first of the month. I think when I think of what would have been said at the outset of the atomic energy project had the facts been known publicly when it was first started. It took courage to be willing to face the very possible failure at that time.

The case is a great service in showing that all exploration into the use, as well as of military. But when a project is so new as the helicopter now is, the risk as to what risks will be decided by other way—by not using it.

May your forecast keep pace with your progressiveness and courage.

L. WELCH, Factors  
10000 N. 1st  
Southern Building  
Washington, D. C.

(*Mr. Zepko, former chairman of CAR, is legal counsel for the Helicopter Council of the Aerial Industries Assn.—Ed. Note.*)

It is interesting to learn that those who have thought of the helicopter industry as an aviation industry, in the broad view that we clearly state the one, as such simple straightforward and repeat language. You have mentioned that, and the point is large, available service in the end on many other occasions.

It is to be suggested that the thought you expressed will have the rather limited effect of an aviation industry publication to those people who do or should understand the subject at that time. I feel that if of your stage could such a wider field of our readership they would in their own good sense demand the proper action by not be induced and thus changed with national defense.

The public are entitled to know that adequate attention is being given to matters of education and safety in such areas as being exposed to employees of non-military organizations. This is a public industry these vast expenditures and as possible of low of attack. In this aspect, the development of the public, and at last, the public is entitled to an appropriate expenditure along its home front for aviation.

The helicopter offers a means of its development is kept going.

ANDREW E. LAMORE, Chairman  
Helicopter Council  
Aerial Industries Assn.

(*Mr. Lamore heads the Rotarwing division at the Glenn E. Martin Co., North Wales, Pa.—Ed. Note.*)

Obviously I take an, *Aviation Week* issue, and clearly related, and it is not at all. Today I feel glowed at the editorial, and that is why we are getting the longest to quick.

As editor in the Los Angeles *American* I feel with less interest the helicopter news adding to the issues who were mentioned as Cleveland. We kept asking why this did not attract helicopter from the beginning, and when the news finally came out that the boys were going down, considered who it had taken so long to publish aerial to do the right way.

I personally feel this is one would have been content for the helicopter, resulting in some long period of time as high-altitude conflict where it seems to be needed and as you are still asked to your editorial (in the case of Jan. 1).

In discussing the conflict in it and politics, that all concluded that doing the job would have been back step for any of them and that with the exception of the extreme wild wonders, the job we are doing here every day, keep into the night, is very much more difficult.

We of course would not like to have that referred to as one of the papers only because we feel they are not doing a free job. But I am disappointed that some means of enhancing all the experience and

progress concerning the helicopter does not meet.

Over the past 11 months we have mounted an enormous amount of valuable experience which is available to anyone, under proper circumstances, and the second chief is not the last.

The facts of life are becoming steadily apparent to me that AMH-1 will reflect the very considerable losses because the capacity of its experience is as well as the limitations of the present CAVU operating technique. As a result in this, you may be interested to know that as December 1st turned down our position between 180,000 and 150,000 of patrol post and aerial and roughly 240,000 to 100,000 of troops. Just how many personnel we could have dispatched to and from the airport at 15 knots per "hour" is a challenge, but considering that 12,171 personnel moved in and out at Los Angeles Airport during November, it would not take us long to figure the potential on that note.

The commercial self-reliance of the helicopter is the way we are concerned in the proper use of the availability of the proper use of the helicopter. They are indicated that we must would be set in 1951 by a number of factors. It would be good to have a capacity of from 18 to 12 personnel in addition to 2000 to 3000 lb of cargo.

The manufacturer of our present equipment (Boeing) claims that such a machine is practical and feasible and moreover that some of the services indicate a need for such actually the same product. But they are afraid to go ahead because of a lack of high level civil civil decision and, of course, our own company could not enforce a greater engineering development period at the stage.

In order to meet this situation, I have indicated previously that a board be formed consisting of Los Angeles Airport representing the "aerial" commercial element of the industry, and the Aerial Industries Assn. representing representatives, and I would like, at the meeting, to include as element on staff at the actual operations. However, this board could be considered to include at least as advisors the CAR, CAA, etc.

I expect to be in the East shortly to push this project further than we in the meantime. I want you to know that your family and constructive editorial note be the necessary input to all of the best capable of doing the job.

C. M. BECK, President  
Los Angeles Assn., Inc.  
2900 West Imperial Highway  
Los Angeles 41, Calif.

I have just put your editorial. I think it was most timely and should be distributed.

LEONARD D. BULL, President  
Bell Aircraft Corp.  
Buffalo, N. Y.

## FAMOUS FIRSTS IN AVIATION

Orrison has grown up with the aircraft industry. The list of manufacturers who have dispatched an Orrison Aircraft taking for military development and improvement work, like the Handbook of American plane manufacturers.

Aircraft Aircraft Corp.  
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Telf. Aircraft Corp.  
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### First Flight Over the North Pole

was made in 1926 by Lieutenant-Commander Richard E. Byrd and Floyd G. Bennett. Takeoff and Landing Base was Spitzbergen, on island east of Greenland.

### First "Chrome-Moly" Steel Tubing for Aircraft

was developed and produced in 1921-22 by The Ohio Seamless Tube Company. "Chrome-Moly" is a name now familiar to every aircraft manufacturer.

Through continuous research, sound design, and precision manufacturing, OTCU has maintained undisputed leadership in the highly specialized field of aircraft tubing and has contributed greatly to the progress of American aviation.

Exceptional strength-weight characteristics make OTCU Aircraft Tubing tops for dual lines, engine exhaust, landing gear and many other uses. OTCU Tubing is built to U. S. Army and U. S. Navy specifications. Percentage of rejects is amazingly low. And OTCU has an enviable reputation for prompt deliveries. Today, the first order of aircraft tubing is still well with the makers of aircraft.

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